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DATA REQUIREMENT (DR) MA-03

PAYLOAD MISSIONS INTEGRATION

PROGRESS REPORT

November 12, 1983, through January 13, 1984  
(WBS 05.1)

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## ABSTRACT

This document summarizes Teledyne Brown Engineering's (TBE) progress on the Payload Missions Integration Contract (PMIC) during the report period from November 12, 1983, through January 13, 1984. It fulfills the requirements of Data Requirement (DR) MA-03 Progress Report.



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## **1. INTRODUCTION**

This report is organized for use by the Spacelab Payload Project Office (SPP0). The Management Summary summarizes the contents of the report. The General Section provides information which concerns two or more missions or is nonmission oriented. The Missions Sections provide information relative to payload integration progress on the specific missions for which TBE is responsible in its PMI contractor role.

Within each section of the report, information is organized in Work Breakdown Structure (WBS) number sequence. Only active WBS elements are identified by number and title for reporting purposes.

## **2. MANAGEMENT SUMMARY**

Highlights of the PMIC contract effort during this period are summarized below.

### **General**

- o Two Supplemental Agreements (SAs) adding 4,965 hours and \$131,098 of effort were incorporated into the contract.
- o Twenty additional Change Order Modification (C/O Mod) proposals and one Engineering Change Proposal (ECP) are in various stages of negotiation. These have tentatively been grouped into five potential SAs.
- o SL-1 MPE components are beginning to arrive at KSC for disposition/storage/reporting by the MPE Inventory Control System.

### **Spacelab Mission No. 1 (SL-1)**

- o Preliminary SL-1 mission extension definition effort has started as a special study task.
- o Three shipping containers for VITR tapes were completed and delivered to KSC on November 16, 1983.
- o We totally supported mission launch and on-orbit activities with PMIC personnel stationed at KSC, JSC, and the HUSC.

### **Spacelab Mission No. 2 (SL-2)**

- o EAS clamps were received and preparations for the Payload Clamp Assembly (PCA) - clamp fit-check are underway.
- o The revised Experiment Power Branching Distributor (EPBD) was completed, tested, and shipped to KSC.
- o All PCA and cruciform design documentation was updated and baselined to support acceptance reviews and delivery to KSC on March 8, 1984.
- o The Phase III Safety Data Package for Experiment Checkout Equipment (ECE)/Ground Operations was developed and submitted.
- o A Verification Status Review was presented to SPP0.

### Spacelab Mission No. 3 (SL-3)

- o Eleven shipments of MPE, which consisted of 574 different line items of hardware, were made during this period.
- o Conceptual layouts and a preliminary design were prepared for carrying the SL-1 Very Wide Field Camera on SL-3.
- o Structural reinforcing hardware for Racks 5 and 7 has been fit-checked and minor problems encountered can easily be corrected.
- o On-site support at KSC was initiated during this period.
- o We provided materials and support for the Phase III Ground Safety Review. Preparation of the Phase III Flight Safety Data Package is underway.
- o Preparations for training the POCC cadre have begun.

### Office of Space and Terrestrial Application (OSTA) Partial Payloads

- o The OAST-1 MPESS and structural/mechanical MPE was delivered to KSC on January 10, 1984.
- o MSL-1 MPE kits are essentially complete and are being stored, pending receipt of minor missing items and MSFC's need.
- o The initial fitup/assembly of MPESS SN 006 for MSL-2 is 80 percent complete. Completion is scheduled not later than March 15, 1984.
- o The MSL-2 MPE PDR was held on December 5, 1983. Satisfactory progress is being made toward the MSL-2 FDOR on February 13, 1984.
- o Baseline issues of the MSL-1 IIAs and the MSL Part I System Specification have been submitted for baselining.
- o We supported the OAST-1 IRR on December 22, 1983. Open verification actions are being actively worked.

### Astro-1 Mission

- o Tests indicate that Hysol epoxy EA956 will meet the requirements needed for the alignment scheme.
- o A subcontract for Integrated Radiator System (IRS) heat pipe procurement will be awarded early in the next report period.
- o Effort is progressing toward delivery of the Astro-1 CDR data package on January 20, 1984, and the Wide Field Camera (WFC) CDR data package on January 30, 1984.
- o Astro-1 IIAs have been baselined.

### Premission Definition

- o A three-volume Dedicated Discipline Laboratory (DDL) Cost-Effectiveness Study final report will be delivered early in the next report period.
- o The Accommodations Study of the LeRC Middeck Payload is nearing completion. The resulting handbook will be delivered early in the next period.
- o The Space Plasma Laboratory Preliminary Mission Definition Study was started and is progressing well.

### Middeck

- o Fabrication, assembly, functional tests, and vibration tests were completed on the Middeck Electronics Module (MEM). A GFE tape recorder failure occurred as a result of vibration testing. MEM acceptance review is scheduled in February 1984, following problem correction and further testing.



### 3. GENERAL

#### WBS 05.0 - PROJECT MANAGEMENT

##### WBS 05.1 - Performance Management and Administration

The project management contract deliverables this period were the DR MA-03, Progress Report submitted on November 28, 1983, and the DR MA-04, Financial Management Report submitted on December 20, 1983.

Two SAs were incorporated into the contract during this period. Their impact was as follows:

<u>SA</u>	<u>Hours Added</u>	<u>Dollars Added</u>
MSFC-267	0	\$ 0
MSFC-270	<u>4,965</u>	<u>131,098</u>
	4,965	\$ 131,098

SA MSFC-267 modified Schedule Article IX - Inspection, Acceptance, and Free on Board (F.O.B.) Point while SA MSFC-270 incorporated the Astro-1 Wide Field Camera (WFC) requirements definition and preliminary design tasks. Twenty additional C/O Mod Proposals and 1 ECP are in various stages of negotiation and have been grouped to formulate 5 additional SAs that will be signed in the near future. Several other ECPs and one C/O Mod Proposal are in the early stages of the negotiation process.

Six C/O Mods were received from MSFC, and we responded to eight C/O Mods, six of which were received prior to the start of this report period.

Responses are being prepared to four C/O Mods at this period's end. There are currently 29 C/O Mod Proposals and 3 ECPs with a cost impact in the MSFC evaluation process.

##### WBS 05.2 - Information Management

During this period, PMIC Information Management activities resulted in the reproduction of 319,870 pages in support of various SPP0 and PMIC documentation requirements. We added 96 new documents to our

master files and coordinated, published, and distributed the November and December 1983 Spacelab Payloads and Applications and Technology Project Management Reports.

#### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

##### WBS 75.9 - Ground Operations Analysis and Requirements Definition

Development of data inputs to the SPP0 MPE Inventory Control System continued. SL-1 components are beginning to arrive at MSFC for disposition/storage. Inventory is reported monthly.

Change Order MSFC-276 (schedules for MSFC/SPP0) was received and work was initiated. We are currently preparing the proposal response, and coordination with SPP0 personnel continued for format and SL-3 schedules development. Sample schedules developed to the new format were submitted to SPP0 for review.

##### WBS 75.10 - Safety and Quality Assurance

We revised and submitted PMIC-TBE-491, DR IR-16, Payload Missions Integration Inspection System Plan.

totally supported the SL-1 launch and mission activities at KSC, the HOSC, and the POCC.

The SL-1 Payload Integration Flight Evaluation Plan was updated and approved by MSFC on November 4, 1983. A quick-look bulletin will be published on January 18, 1984, to document the results of the quick-look turnover meeting. The early assessment and anomaly status bulletins and the interim assessment bulletin will be published on January 23, 1984. The final assessment bulletin will be published on February 8, 1984.

#### WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

##### WBS 95.1 - Onboard Flight/Mission Operations

The Payload Flight Data File (PFDF) for SL-1 was finalized. After the final crew review, changes were posted and the PFDF was packed for stowage on the Shuttle.

##### WBS 95.2 - POCC Requirements

The final Joint Integrated Simulation (JIS) was conducted November 16, 1983. It was a 12-hour activation simulation begun at T-12 minutes. We supported the pre-simulation briefings and participated in the simulation from the Huntsville Operations Support Center (HOSC), the Payload Crew Training Complex (PCTC), and the Payload Operations Control Center (POCC).

The POCC Operations Training Documents for Joint Integrated Simulations 2, 3, 4, 5, 6, 7, 8, and 9 were delivered.

The HOSC HRM Data Base, a derivative of the SL-1 Payload Data Base, was finalized and delivered to EL14 for use in the HOSC during the mission.

Our POCC cadre training personnel monitored SL-1 mission activities from the HOSC and the POCC for the purpose of assessing the training provided to the POCC cadre and to assist in gathering lessons learned information from participants involved in the mission/flight operations of SL-1. The results of the assessment of POCC Cadre training is being prepared for EL14. The mission operations lessons learned

material is being assembled into viewgraphs with supporting data for the SL-1 Mission Manager.

WBS 95.3 - Payload Data Processing Requirements

We provided assistance to Boeing by clarifying requirements of the updated Automated Data Requirements System. We continued to monitor the Spacelab Data Processing Facility (SLDPF) data processing activities for the purpose of providing assistance if needed.

WBS 95.4 - Public Affairs Inflight Video and Photographic Requirements

Revision A to the final TV/Photo Operations Book was prepared and delivered to EL15 for inclusion in the SL-1 PFDF.

We participated in the preparation for and conduct of the SL-1 mission by manning the TV Operations position in the POCC. Subsequent to the mission, we assisted JSC in cataloging the television that was received during the mission.

## 5. PACELAB MISSION NO. 2

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

##### PCA

The two revised pallet attach fittings (X strut forward) were completed, painted, and installed on the Payload Clamp Assembly (PCA). The ESA clamps were received and preparations are being made to fit-check them to the PCA.

##### Cruciform

All VFI parts (other than MDTSCO-supplied parts) were ordered and are scheduled to arrive not later than January 17, 1984. The VFI installation is scheduled to start January 21, 1984.

##### VCAP

All piece parts are now completed and the assembly process has begun.

##### Network Cables

Sixteen more cables were completed and are in the MSFC vacuum bake process. Five flight cables are in the fabrication process. Fifteen cable drawings were just received and work will start as soon as possible. Ten cables were shipped to KSC on December 2, 1983.

##### VFI Cables

These cables are in work and will be completed in time for installation on the cruciform.

##### MLI

The blankets for coldplates 1 and 12 are complete and Sheldahl has started fabrication of the blankets for coldplates 5, 6, 8, and 9. The Experiment 6 MLI blankets are nearing completion and will be source inspected the week of January 16, 1984. The Experiment 10 electronics

MLI blankets are also nearing completion and will be source inspected at the same time.

The MLI tent frames for the coldplates are in work. The tube material was changed to 6061 aluminum and the material was ordered and received. At this time, all pieces are cut and bent to the proper bend radii. The coldplate tent frames will be completed in the following order: Coldplates 6, 8, 12, 1, 5, and 9.

#### Experiment Power Branching Distributor (EPBD)

The revised EPBD was completed, tested, and shipped to KSC on December 7, 1983. The second EPBD (SN 001) was received and will be revised to the new configuration as soon as shop loading will permit.

#### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

##### WBS 75.2 - MPE Final Design

All PCA and cruciform design documentation was updated and baselined to support the hardware acceptance reviews and delivery to KSC scheduled for March 8, 1984.

We conducted receiving/inspection reviews of the ESA-provided GFE hardware for the PCA assembly on December 14, 1983, and January 6, 1984. Receipt of this hardware was required to complete the PCA and cruciform prior to shipment.

PCA clamp unit housing simulator designs were developed and baselined in mid-December to replace the unqualified FOP clamp units for Level IV activities at KSC. This hardware will allow normal Level IV activities, e.g., PCA-IPS alignment and cruciform-PCA installation to proceed on schedule. Installation of the qualified clamp units will be accomplished at KSC near the end of Level IV testing. A plan and schedule of this activity was presented at the SL-2 Cargo Processing Review at KSC on January 9, 1984.

The Experiment 10 HRTS telescope forward section and aperture door insulation blanket designs were baselined and released after additional new requirements were defined by NRL. The Experiment 11 insulation design was extensively revised to accommodate changes to the

instrument and submitted for baseline review on January 13, 1984. Additional changes are anticipated as the result of instrument EMI problems discovered during tests.

Design documentation for the Experiment 10 HRTS telescope thermal shroud was sent to NRL in mid-December 1983 to establish interfaces. We anticipate results from the NRL review will be received during the week of January 16, 1984.

#### WBS 75.9 - Ground Operations Analysis and Requirements Definition

The initial release of the deintegration requirements was completed and submitted for review on December 9, 1983. GIRD maintenance is continuing.

#### WBS 75.10 - Safety and Quality Assurance

The Phase III Safety Data Package for ECE/Ground Operations was developed and submitted to MSFC for transmittal to KSC. Change pages were developed to incorporate newly acquired verification data and were transmitted to KSC. Viewgraphs and presentation materials were developed to support the Phase III KSC review scheduled during the next report period.

We prepared and presented Acceptance Data Packages on 10 cable assemblies and EPBD SN 003.

#### WBS 75.11 - Configuration Change Coordination and Processing

We continued to process Engineering Change Requests (ECRs) and Engineering Change Proposals (ECPs) against SL-2 baselined documentation. This effort required the preparation of PCN folders, the tracking of the change data in the SCIT, the distribution of change evaluation requests, and the preparation and processing of change control board directives for SL-2 changes submitted to SPP0. We published a weekly SL-2 Open Action Report, K014, and a TBE Drawing Release List (DRL) which reflects all SL-2 MPE CEIs being built by TBE.

We submitted the SL-2 Experiment 10 blanket drawings for SPP0 review and released the following SL-2 revised ECPs to SPP0:

<u>ECP NO.</u>	<u>TITLE</u>	<u>CEI</u>
TBE 105FR1	Update Cruciform Assembly and Part I and II CEI Specifications to Incorporate Baseline ESA Hardware	F23001A
TBE 112FR1	Update Spacelab 2 Payload Clamp Assembly Documentation to Incorporate the ESA/DS IPS Baseline	F23002A

We continued to perform the configuration management requirements for SL-2 MPE being designed by MSFC/S&E and controlled by the Spacelab Payloads MPE, Level III Configuration Control Board (CCB). We published a monthly Spacelab Payload MPE (MSFC/JA51) DRL, PMIC-DRL-3774, which reflects all releases authorized by this CCB.

We prepared the agenda and minutes for the SL-2 Payload Level II CCB which met December 21, 1983.

#### WBS 75.12 - Interface Agreements

An ECR was submitted to revise the power profile for Experiment 2. Change pages for 13 approved ECRs were incorporated and submitted for distribution. We participated in the Experiment 3 IIR/AR, at the University of Iowa, to obtain verification data to complete open items required by JA-061, experiment verification requirements.

#### WBS 75.13 - Integrated Payload Compatibility

An IPRD ECR was developed and submitted to update design requirements for experiment timeline requirements, Experiment 3 PDP subsatellite flight maneuvers, Experiment 14 data, the PCA actuator configuration, and experiment load criteria.

Structural verification submittals for Experiments 7, 8, and 13 were reviewed. All open items addressed in these submittals were closed. Remaining open items were identified and transmitted to the experimenters.



An SL-2 Verification Status Review was presented to SPP0. The status of all experiments was presented and action items were assigned.

We continued the "base drive" development to validate the design load factors for the SL-2 cruciform/PCA.

The Experiment 6 structural analysis was updated in response to action items generated by S&E.

Fracture Control Plans (DR IR-56) for Experiments 2, 7, 8, and 13 were partially completed. The Experiment 9 IR-56 and Experiment 14 MPE IR-56 were revised per the Fracture Control Board recommendations.

#### WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

##### WBS 95.1 - Onboard Flight/Mission Operations

Work continued on the preparation of simulator acceptance test procedures for the SL-2 experiment simulators. Acceptance test procedures were delivered to EL12 for Experiment 10. Work continued on the generic display and command response simulator for SL-2.

We started preparation of the SL-2 Payload Flight Data File (PFDF) by preparing covers for some of the books.

##### WBS 95.2 - POCC Requirements

The telemetry file of the SL-2 payload data base was prepared and delivered to EL14. It included the subsystem and verification flight instrumentation (VFI) measurements as well as the payload measurements. Work started on the command file and this is where most of the effort was spent during this reporting period.

The Ground Integration Requirements Document (GIRD) was reviewed and the measurement numbers associated with TBDs in the GIRD were determined.

## 6. SPACELAB MISSION NO. 3

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

During this period, the payload bay structural MPE was completed and delivered. The underfloor hardware was installed on the underfloor mockup. From this arrangement, cable lengths were determined. The underfloor fluid loop test was performed to verify the loop integrity, flow rates, and rack bypass valve settings. The test was successfully completed and the tubing assemblies were removed, cleaned, and shipped. The Rack 4 fit-check/final assembly was accomplished and then disassembled, cleaned, and shipped.

There are three cables in the MSFC bake cycle and nine cables in work. Eight cables have been shipped to KSC and 26 will be shipped January 16, 1984.

The following shipments were made during this reporting period:

<u>ITEM</u>	<u>DESTINATION</u>	<u>DATE</u>
1. Rack 4 Hardware	KSC	11-19-83
2. Rack 12 Hardware	KSC	11-22-83
3. Water Pump Package	KSC	11-30-83
4. Racks 6, 9, 11 Hardware	KSC	11-30-83
5. MPESS SN 003 and some Payload Bay Hardware	KSC	12-16-83
6. Payload Bay Hardware	KSC	12-23-83
7. Underfloor Hardware	KSC	12-30-83
8. GFFC Cable	MSFC	01-05-84
9. ATMOS Support Structure	KSC	01-07-84
10. IONS Expansion Point Assemblies	KSC	01-11-84
11. Racks 6, 9, 11 Hardware	KSC	01-11-84

These shipments included 574 different line items of hardware which consisted of 5,546 pieces, 258 of which were manufactured items.

## **WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS**

### **WBS 75.1 - Configuration Design Definition**

Conceptual layouts and a preliminary design were prepared for stowing the SL-1 Very Wide Field Camera (VWFC) in the center aisle.

We continued preliminary design layouts for stowage items, but continuing changes in stowage requirements presented difficulties in producing a final design configuration.

The Stowage Data Pack was prepared for the Stowage Review and sent out on December 30, 1983, to all Experiment Developers and appropriate NASA personnel. Viewgraphs were prepared for the Stowage Technical Review which was conducted on January 12, 1984.

### **WBS 75.2 - MPE Design**

The structural reinforcing hardware for Racks 5 and 7 was hand-carried to Ames Research Center and fit-checked in their ground racks. Only minor problems were encountered and the necessary modifications are to be made with Field Engineering Changes (FECs) at KSC. Necessary EOs to cover the FECs were prepared.

The fabrication drawings for the ground servicing unit were baselined (this unit charges the flight accumulator during ground testing).

Considerable time is being spent on the phone with KSC Level IV integration personnel troubleshooting the fit-up problems caused by rack configuration dimensions being out of tolerance.

### **WBS 75.5 - Environmental System Integration**

A study to determine the number of LIOH cartridges needed for the mission was completed and submitted.

### **WBS 75.6 - Electrical System Integration**

The Integrated Payload Electromagnetic Compatibility Analysis Report (Pre-Level IV) was completed and released for review on schedule.

A preliminary assessment of requirements and a design impact definition for inclusion of the VWFC experiment in the SL-3 payload was completed.

A revision of the electrical system schematic to reflect recent cable/interface changes was initiated.

#### WBS 75.7 - Structural/Mechanical System Integration

We completed the updating, model verification, and model reduction (via NASTRAN ASET) of the integrated-rack NASTRAN models of Space-lab Module Racks 5, 6, 8, 9, and 11 and delivered the NASTRAN models for incorporation into a coupled-loads analysis. Of the remaining three racks (3, 4, and 7), Racks 3 and 4 are more than 90 percent complete and Rack 7 is approximately 75 percent complete.

We updated the stress analysis for the ESS Payload Adapter to clear up questions resulting from the MPE verification performed by MSFC S&E.

During the review period, we supported Fracture Control Board (FCB) meetings for the DDM experiment and for our own MPE designs. Based on the FCB recommendation, the MPE Fracture Control Plan was revised and the DDM plan is being revised. We also are currently performing fracture analysis for ARC LSP experiment.

#### WBS 75.9 - Ground Operations Analysis and Requirements Definition

We continued to coordinate review comments to the deintegration requirements in preparation for baselining the requirements. Changes 1 through 4 were prepared for the GIRD as a part of continuing GIRD maintenance. The changes included revising experiment resource requirements, update of the Mission Sequence Test, and the addition of the VWFC.

#### WBS 75.10 - Safety and Quality Assurance

Materials were developed and support was provided for the SL-3 Phase III Ground Safety Review conducted with KSC by telecon. The Phase III Flight Safety Data Package is in development, and considerable effort is being utilized to acquire closeout data on experiment hazards.

In the Quality Assurance area, we prepared and presented acceptance data packages on the following:

- o Rack 4
- o MPESS SN 003 and Associated GHE
- o Payload Adapter
- o Ions Support Assembly
- o Utility Bridge
- o ESS Installation Assembly
- o Underfloor Spares
- o ATMOS Support Structure
- o Rack 6, 9, and 11 Spares
- o Rack 12 Cable Assembly and Closure Panel.

#### WBS 75.11 - Configuration Management

Configuration Change Coordination and Processing activities during this period required extensive change processing coordination with the MSFC Level II and the PMIC/TBE Level IV CCBs. We supported MSFC Level II CCB meetings on December 22, 1983, and January 13, 1984. This support included the preparation and distribution of the agendas and minutes for these meetings and the preparation of Level II Configuration Control Board Directives (CCBDs) reflecting the Board dispositions of the change requests considered during these meetings. The December 22, 1983, Level II CCB agenda included 28 scheduled change requests. We prepared and coordinated Level II CCBDs reflecting Board dispositions of the considered changes. The January 13, 1984, Level II CCB agenda included eight change requests and two walk-on changes. We prepared and coordinated Level II CCBDs reflecting Level II CCB dispositions. Support for the PMIC/TBE Level IV CCB encompassed the preparation of Level IV CCBDs approving numerous SL-3 MPE drawing revisions, baselining SL-3 MPE drawings, and approving Engineering Change Orders (ECOs) against previously baselined SL-3 MPE drawings. We baselined the FES/VCGS IIA.

We continued to process and track actions to close discrepancy notices (DNs) submitted against the various milestone review data packages and published periodic reports reflecting open DN actions. We

published on a regular basis reports reflecting SL-3 baselined documents, open change activities, and TBE-released drawings. We supported a JA21 meeting during which the SL-3 Mission Manager reviewed all SL-3 IDE, FDOR, and software PDR and CDR DNs and established new closeout dates.

#### WBS 75.12 - Interface Agreements

The FES/VCGS IIA was baselined during this period. The AFT IIA was updated per the Experiment Developers' comments. A preliminary VWFC IIA was prepared for the Experiment Developer's comments.

#### WBS 75.13 - Integrated Payload Compatibility

On December 1, 1983, PMIC submitted to the MSFC Documentation Repository JA-019, the SL-3 IPRD Revision B, which incorporates the ECR TBE3-0169 changes as approved by Level II CCBD No. 203-83-0042.

ECR TBE3-0186 was prepared and sent to SPP0 on December 15, 1983. This ECR incorporated staging changes generated by the addition of the VWFC on revision B of JA-019. The VWFC experimenters were contacted and requested to provide IPRD inputs into the pending VWFC ECR.

MPE verification has supported all MPE Acceptance Reviews during this period. This effort now has approximately 46 percent of the MPE verification items closed.

We reviewed a large number of verification items for the ARC LSP experiments in Racks 5 and 7 and identified numerous discrepancies which appeared to threaten the ARC experiment's capability to fly. We briefed MSFC S&E on this and subsequently participated in a meeting with MSFC and ARC to formulate a plan for resolving the problems. To help resolve these problems, we are currently using our NASTRAN models to verify the RAHF natural frequency and to define correct design loads for problem components in Racks 5 and 7.

#### WBS 75.14 - Mass Properties

The November 30, 1983, Mass Properties Report was submitted on December 19, 1983, in accordance with our letter dated November 30, 1983, requesting an extension. The data base was modified as required. Support was provided for verification and MPE shipping mass data.

## **WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION**

### **WBS 95.1 - Onboard Flight/Mission Operation**

Preparation of the Payload Flight Data File (PFDF) continued with the publication of experiment operating procedures for DDM and the delivery to EL15 of the PFDF as it existed on November 23, 1983.

### **WBS 95.2 - POCC Requirements**

The preliminary telemetry file of the payload data base was delivered on January 13, 1984. Approximately 1300 entries were developed for the FES/VCGS, ATMOS, and RAHF dedicated channels. Work started on the command file of the data base with approximately 500 entries made. Initial work was done on the command delog file and the research of error messages.

We started preparations for training the SL-3 POCC cadre by reviewing experiment and mission operations data. An assessment was made of the adequacy of the Experiment Simulator Modeling Requirements (ESMRs) to support POCC cadre and PI training. The minor problems identified can be worked around.

We attended three briefings on SL-3 experiment operations and started preparation of the SL-3 training plan. Work started on the development of a concept for automating the retrieval of training records data.

Our planning is addressing the potential impact of needing to support SL-2 and SL-3 POCC cadre and PI training simultaneously.

### **WBS 95.3 - Payload Data Processing Requirements**

A new data requirements form (DRF) was developed in preparation for obtaining data processing requirements from the SL-3 Principal Investigators (PI). This form should simplify the process and decrease the number of pages of requirements associated with each experiment that will be needed in the SLDPF Requirements Document.

### **WBS 95.4 - Public Affairs Inflight Video and Photographic Requirements**

Work started on finalizing the TV requirements for this mission in preparation for starting scene development activities in the PCTC SL-3

mockup. We attended the presentations on SL-3 experiment operations provided by EL14 that will assist in scene development activities and our preparation for functioning in the TV Operation position in the PCCC.



## 7. OSTA PARTIAL PAYLOADS

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

##### OAST-1

The OAST-1 structural/mechanical MPE final assembly was completed this period. This MPE was mounted to MPESS SN 004 and match-drilled. It was then disassembled and painted. The necessary MPE was then final mounted to the MPESS in its OAST-1 flight configuration and shipped to KSC on January 8, 1984. The DAE outrigger was also shipped separately at that time. Approximately 3 percent of the purchased hardware was not shipped. It is expected to arrive at TBE not later than January 31, 1984, and will then be shipped to KSC. Four electrical cables were completed and the remaining are expected to be complete by the end of January.

##### MSL-1

The assembly of the Get Away Special (GAS) brackets and the MSL-1 cable fabrication were completed. All MSL-1 items have been placed into kits, with only a few items missing. The missing items have been ordered and, when received, the kits will be completed. All kits will be stored at TBE until required by NASA.

##### MSL-2

The initial fitup/assembly of MPESS SN 006 for MSL-2 started on December 15, 1983, and is 80 percent complete. The design was changed to increase the load-carrying capability for generic MSL missions. The drawings were baselined on December 30, 1983, and fabrication of the required new parts started. These parts are 80 percent complete and we intend to complete this structure not later than March 15, 1984.

Long-lead materials for the MSL-2 MPE have been ordered. Our shop has started work on the System Control Unit (SCU) enclosure and GHE.

## WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

### WBS 75.1 - Configuration Design Definition

#### OAST-1

An ECO to OAST-1 Dwg. F4-30163 (Payload Support Structural Assembly) was issued to incorporate various piece part design changes.

#### MSL-2

The A&I drawings are being completed for the February 13, 1984, IPL/MPE FDOR. Ground handling studies were performed, including a stress analysis of the existing shipping cradle for MSL-2 requirements, with a resulting redesign of the shipping cradle/spreader beam.

### WBS 75.2 MPE Design

#### OAST-1

During this period, we provided sustaining engineering for OAST-1 manufacturing, A&I, and paint activities. As a result, design changes were made to various OAST-1 MPE items to accommodate these activities. ECP 113F (and a revision R1) was issued along with ECOs to the following detail drawings: F4-20003, F4-30167, F4-30170, F4-30172, F4-30175, F4-30199, F4-30597, F4-30598, F4-30603, F4-30611, F4-30612, F4-30615, and F4-30617. A final issue of the OAST-1 metallic and non-metallic materials list (DR IR-36) is being completed and will be submitted in the near future.

#### MSL-2

Approximately 75 structural/mechanical drawings and the associated design documents (specified lists, material lists, and design review package) were submitted at the December 5, 1983, PDR.

We participated in the MPE PDR and also completed the redesign and analysis of the MPESS to meet MSL requirements. Preliminary thermal analyses of MPE were completed for the PDR on December 5, 1984. Analyses are now being expanded and will be compiled for the FDOR on February 13, 1984. We started delivering baselined MPE fabrication

drawings to fabrication on January 3, 1984. All MPE drawings will be submitted by January 25, 1984.

The SCU Working Group continued to meet, with the design status, schedule, and parts procurement status presented at each meeting. As part of the Working Group's activities, the chairman and other members visited the TBE facilities for a first-hand observation of the methodology used in parts tracking and to see the packaging concept of the individual SCU boards and enclosure. A three-card slot enclosure was viewed which showed the basic packaging techniques used in the SCU.

On November 21, 1983, the SCU and SCU GSE Software Requirements started with the distribution of the SCU and the SCU GSE Requirements Specifications. Along with the distribution of the specifications, a formal presentation was given to summarize the requirements imposed against the SCU and SCU GSE. Eleven DNs were received against the specifications. All of the DNs were dispositioned during the MSL-2 PDR preboard held on January 10, 1984. Of the eleven, five are now closed with six to be closed using further information supplied at the software CDR. The software CDR is scheduled for the first week of February 1984.

On December 16, 1983, the SCU hardware CDR started with the distribution of the CDR data pack and formal presentation of the SCU and SCU GSE design.

The GSE designs were released to the vendor to start the wire wrapping process. We are awaiting the computerized lists for engineering checking. The SCU CPU and memory board purchase orders were released to Multiwire for fabrication. The remainder of the SCU board designs were provided to vendors for PCB fabrication estimates.

The breadboard buffered Serial Digital Input/Output board is presently being wire wrapped in anticipation of the verification tests with the FES/VCG PCDA.

## WBS 75.4 - Command and Data Requirements

### OAST-1

On January 16, we will present a CDMS status review at a dry run for the OAST-1 Flight Operations Review that is scheduled for January 24. We continued to support the OAST-1 simulation development at JSC via telecon, answering questions on MCDS display pages and keyboard commands. We provided a memo to JSC (Ted Buras) on January 17 describing changes to OAST-1 PIP Annex 4 to correct fault detection/annunciation parameter from CID temperature to laser diode temperature. The memo was preceded by a telephone conversation with JSC. This change was requested by MSFC per memo ED24-3-84.

## WBS 75.5 - Environmental System Integration

### MSL-2

The thermal models of the MSL-2 payload were completed and most of the on-orbit computer simulations were completed. Compatibility analyses are underway and will be completed in approximately two weeks.

## WBS 75.6 - Electrical System Integration

### OAST-1

PMIC personnel supported electrical MPE fabrication, as well as MPE and Power Control Box acceptance reviews. The development of an Integrated Payload Electromagnetic Compatibility Analysis Report was initiated on the basis of experiment developer test results. An SAE experiment pyrotechnic circuit bent pin failure mode analysis was performed in response to a safety concern.

### MSL-2

The MSL-2 PDR Data Package was completed and released as scheduled on December 5, 1983. The package included a cable interconnect diagram, electrical system schematic, cable assembly drawings, and a compatibility assessment. Inputs were developed for inclusion in the experiment IIAs, IPRD, PIP annexes, Unique ICD, and Part I System Specification.

The development of an MSL-2 FDOR data package was initiated to include an MSL and an MSL-2 configuration. Compatibility analyses and a Part II System Specification are being generated in addition to a complete revision of all drawings and parts/material lists.

#### WBS 75.7 - Structural/Mechanical Systems Integration

##### OAST-1

The Fracture Control Plan for OAST-1 MPE was revised to show the modified end fitting. We also revised the Fracture Control Plan for the SAE experiment and reviewed it with the FCB for a second time. We are now incorporating the board recommendations. The evaluation of the OAST-1 Ground Handling Equipment was completed (P321 ((OAST-1)) 83-22)).

##### MSL-1

The MSL-1 coupled loads model was prepared for shipment to JSC.

##### MSL-2

We completed a preliminary structural/mechanical compatibility assessment of the MSL-2 payload. The compatibility analysis for the FDOR was started and is approximately 60 percent complete.

#### WBS 75.8 - Pointing/Stabilization Systems Integration

##### OAST-1

The final issue of the OAST-1 Pointing/Stabilization DR IR-06 was prepared and will be submitted in the near future.

#### WBS 75.9 - Ground Operations Analysis and Requirements Definition

##### OAST-1 and MSL-1

GIRD maintenance activities continued.

##### MSL-2

We submitted Section 10 input data for the three IIAs. The preliminary MSL-2 GIRD was prepared and distributed for internal review in preparation for the February 1984 FDOR. Coordination activities with

the SPP0 and S&E were accomplished on a daily basis during GIRD development.

#### WBS 75.10 - Safety and Quality Assurance

##### OAST-1

Materials were developed and support provided for the OAST-1 Phase III KSC Safety Review, which was accomplished by telecon. Hazard analyses were updated and preliminary copies of the Phase III Flight Safety Data Package were submitted to MSFC. There are still numerous open items, and activities are continuing to acquire experiment safety verification.

We prepared and presented acceptance data packages for MPES SN 004 and associated GSE and the OAST-1 MPE.

##### MSL-2

Minor changes to some of the previously submitted hazard reports for the MSL-2 Phase O/I Flight Safety Data Package were developed for transmittal to JSC to support the safety review scheduled during the next report period. Presentation materials were developed and support was provided for the dry run.

#### WBS 75.11 - Configuration Change Coordination and Processing

##### OAST-1 and MSL-1

We continued to process all ECRs and ECPs against the current OAST-1 and MSL-1 baselines. This effort required preparation of PCN folders, processing of change evaluation requests, tracking changes in SCIT, and preparation of CCBDs. We published a weekly partial payload open action report, K32A, which lists all outstanding open actions against OAST-1 and MSL-1 baselined documentation.

We continued to track DN open actions and published monthly the open actions in the partial payload discrepancy notice SCIT report, K062.

We baselined and released to the MSFC Documentation Repository the OAST-1 Shipping Configuration Drawing F4-10040. The following OAST-1 ECPs were released to SPP0:

<u>ECP NO.</u>	<u>TITLE</u>	<u>CEI NO.</u>
TBE 113FR1	Revise Part II CEI Specification Generation Breakdown	F43003A
TBE 114F	Change Potting Specification	F44003A

The OAST-1 Thermal MPE Part II CEI Specification, C1-4-002-TBE-A, has been submitted for S&E review and evaluation prior to baselining

We prepared the agenda and minutes for the Partial Payloads Level II CCB which met December 21, 1983. We performed the secretary duties for the OAST-1 MPE Acceptance Review Board which met December 20, 1983, and the OAST-1 Payload Integration Readiness Review Board which met December 22, 1983.

We baselined and released to the MSFC Documentation Repository the MEA-1 Shipping Configuration Drawing F4-10038.

#### MSL-2

We prepared and distributed the MSL-2 MPE Preliminary Design Review Plan and Data Package and supported MSFC review team and Preboard activities. We entered into SCIT the 33 DNs submitted against the data package. We supported the MSL-2 Preboard on January 10, 1984, during which the Preboard dispositioned the MSL-2 MPE PDR DNs and the Software Requirements Review DNs. We published minutes reflecting these dispositions and Preboard assigned actions. We continued to track the MSL-2 IPL RR DNs.

#### WBS 75.12 - Interface Agreements

##### OAST-1

We prepared revised ECR inputs for the OAST-1 SAE and DAE IIAs. We supported the OAST-1 Level II CCB meeting of December 21, 1983, which approved ECR-0184 to update SCCF IIA, ECR-0170 to revise DAE IIA, and

ECR-0158 R1 to update the SAE IIA. The Board deferred two ECRs to revise the SAE and DAE IIAs.

In an effort to baseline the OAST-1 Payload Subsystems Interfaces document, JA-331, and expedite the delivery of GFP for OAST-1 integration, a coordination meeting between SPP0, SPO, PMIC, and MTDSCO was held on January 9, 1984. As a result of this meeting and a followup meeting on January 12, 1984, it was agreed to revise the document to incorporate the latest available information and resubmit it for baselining.

#### MSL-2

The three MSL-2 Experiment Instrument Interface Agreements (IIAs) were submitted to MSFC for baselining on November 29, 1983. These IIAs were updated to include S&E comments and resubmitted to MSFC for baselining on January 11, 1984.

#### WBS 75.13 - Integrated Payload Compatibility

##### OAST-1

Closeouts were submitted on all DNs from all OAST-1 design reviews which had PMIC-assigned actions. Only three of these actions from the FDOR are awaiting approval.

The SCCF thermal concern was resolved by providing four thermal isolators as MPE from TBE and by the application of the low emissivity tape provided by JPL to both sides of the SCCF interface plate.

A review of the DAE verification data status was held in early December. This information is expected to be available soon.

The MPE Acceptance Review for OAST-1 was held on December 20, 1983. MPE certification for the DR IR-29 Acceptance Data Package was prepared and the mechanical hardware was shipped on January 8 and arrived at KSC on January 10, 1984. Open items include delivery of the MPE cable assemblies and PCB heater assembly, installation, and test. The PCB is in the process of being transferred as GFP from MDTSCO to TBE.



We attended and supported the OAST-1 payload IRR held on December 22, 1983. Open verification items are being actively worked, including the OAST-1 Phase III Integrated Hazard Analysis. The DAE experiment was not ready for the IRR.

Following the November 17, 1983, meeting, the OAST-1 MSFC POWG meetings were suspended until January 5, 1984. We attended the January 5 and January 12, 1984, POWG meetings, which were in preparation for the OAST-1 Flight Operations Review scheduled for January 24, 1984.

The OAST-1 Materials Identification and Usage List was submitted to S&E for review and verbal approval was received.

#### MSL-1

We reviewed the IH/SR data package on MSL-1 and submitted comments.

The MSL-1 Materials Identification and Usage List was submitted and verbally approved.

#### MSL-2

The System Specification for MSL (CEI Part I) B1-4-0056-TBE was submitted to MSFC for baselining on December 8, 1983. This specification was updated to include S&E comments and resubmitted to MSFC for baselining on January 11, 1984.

The MSL-2 Integrated Payload Requirements Document, JA-380, was completed and submitted to MSFC for review on January 10, 1984.

The MSL-2 Integrated Verification Plan, JA-379, was completed and submitted to MSFC for review on January 10, 1984.

The Materials Usage and Identification List for the SCU was submitted to MSFC during this report period.

The MSL MPE Preliminary Design Review (PDR) Data Package was completed and submitted to MSFC for review on December 5, 1983. We supported the MSL-2 MPE PDR team meetings on January 4, and the Preboard meeting on January 10, 1984, and responded to 28 DNs against the MPE PDR Data Package.

WBS 75.14 - Mass Properties

OAST-1

The mass of shipped data was updated in preparation for the February 1, 1984, quarterly report.

MSL-1

Mass data is being updated for the February 15, 1984, quarterly report.

MSL-2

Effort is underway to provide a Mass Properties report for the MSL-2 CDR.

## 8. ASTRO-1 MISSION

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

The Epoxy Test Fixture was delivered to Building 4708 on December 12, 1983, to begin the testing of an epoxy. The tests indicated that Hysol epoxy EA956 meets the requirements for use in the alignment scheme for Astro-1.

On January 5, a subcontract was let to Essex for the fabrication of an integrated cruciform simulator and cradle. The basic cruciform mockup and cradle are to be delivered at CDR, January 20, with experiment mockups to follow later.

On December 12, a Technical Directive (TD) was received to provide items for a prototype of a 31-volt boost regulator. The necessary steps have been taken to start this project, with only a few additional drawings required from NASA to be able to fully complete the project.

Heat pipe procurement activities for the Astro-1 Integrated Radiator System (IRS) are progressing. We are waiting on baseline drawing reproduction so we can complete the package to be forwarded to TBE procurement for subcontract award.

### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

#### WBS 75.1 - Configuration Design Definition

Good progress was made during this reporting period on the assembly and integration drawings for the Astro-1 cruciform, IRS, and Payload Clamp Assembly (PCA). All assembly drawings reflect the maturity of the detail design at the end of the reporting period and will be included in the CDR data package.

#### WBS 75.2 - MPE Design

Most of the design work during this reporting period was geared toward preparations from the CDR and delivery of as many detail design

drawings to checking as possible. At the end of the period, approximately 218 drawings had been submitted for checking and 283 drawing sheets, along with parts lists, were reproduced for inclusion in the CDR data package. The design group also prepared and delivered for CDR, three DR IR-36 MULs, three DR IR-27 summary documents, and three DR IR-02 Part II CEI specifications. Three DR IR-04 Part I CEI specifications were also updated for baselining.

During the review period, stress, dynamic, and fracture control analyses continued at a rapid pace to verify that the Astro-1 cruciform, PCA, and IRS final designs satisfy the design requirements of their CEI Part I specifications. Most of the analyses are complete and will be submitted for CDR in PMIC-ANAL-4040, -4041, and -4042 and in PMIC-IR56-4045.

Additional thermal alignment/stability analyses were performed during this period to assess the use of heat pipes on the cruciform. Analysis results indicated that the cruciform heat pipes were ineffective with the existing design; hence, the decision to use heat pipes on the cruciform was cancelled.

Updating of the PCA/cruciform thermal math model was completed. All computer simulations and evaluations of the data were completed. Documentation of the thermal analysis is now underway with delivery scheduled for January 20.

A vendor was selected for the IRS heat pipes. Negotiations were completed and work on the heat pipes will begin shortly. Documentation of the IRS analyses was completed, is included in PMIC-ANAL-4108, and will be delivered with the CDR data package.

The WFC assembly and integration drawings were reconfigured during this reporting period to allow use of a maximum length Sun shade. The assembly drawings are in final preparation for delivery with the WFC CDR package on January 30, 1984. Installation details are included in the Astro CDR package.

Work on the detail design of the WFC has proceeded rapidly during this period. The mounting legs were redesigned to allow for a

longer Sun shade. Drawings for most detail parts are well underway and will be included in the WFC CDR package.

Development of the WFC stress and dynamic model was continued during this period and is nearing completion. Updating of the WFC thermal models is underway. Thermal simulations will be performed and the results documented for the CDR in February.

The development of the electronics for the WFC is progressing towards a CDR. We completed individual circuit breadboarding and test for the EIU Analog/Discrete Interface board. About 75 percent of WFC EIU firmware is written, and 25 percent is checked out. We have completed all EIU digital interface breadboard wirewrapping, and it is 60 percent checked out. The EIU internal harness pin list has been generated, and the motherboard I/O pin block connectors were ordered. The tempo power supply modification was changed to only include 100 Vdc capacitors using existing electrolytic filter capacitors. We completed WIREMASTER and CHANGEMASTER software to generate EIU breadboard wirelists and changes. EIU breadboard checkout is 60 percent complete.

A Material Usage Agreement (MUA) for EIU nylon connectors and silver plated wirewrap wire was submitted to and approved by MSFC. Two standard EMM/SESCO chassis and six standard wirewrap boards are now on order. About 90 percent of the flight parts are on order.

#### WBS 75.6 - Electrical System Integration

Efforts to establish requirements and define the most cost-effective design approach for a thermal gradient sensor system continued. A contract end item specification (Part I) was completed for inclusion in the Astro-1 CDR data package to be released on January 20, 1984.

#### WBS 75.10 - Safety and Quality Assurance

A preliminary FMEA was performed for Astro-1 IPS/PCA/cruciform deploy/restow operations. The report was developed and will be submitted at FDOR.

Hazard analyses were performed and a Preliminary Phase II Flight Safety Data Package is in preparation for submittal at FDOR. The preliminary package will be updated prior to shipment to JSC.

#### WBS 75.11 - Configuration Change Coordination and Processing

During this period, we prepared and coordinated the IPL FDOR/MPE CDR review plan and assembled and distributed the review data package. We baselined the following Astro-1 Instrument Interface Agreements:

- o WUPPE-JA299
- o HUT-JA301
- o UIT-JA300.

#### WBS 75.12 Interface Agreements

Revised versions of the WUPPE, UIT, and HUT IIAs were completed and the three documents were baselined on January 9. During the final preparation, a comparison of the mechanical interface data for the experiments revealed that the WUPPE baffle was five inches shorter than the UIT and HUT baffles.

The Image Motion Compensation System (IMCS) ICD was developed and submitted for Level II CCB baselining. Three IMCS RIDs are open for data. The WFC ICD was also developed.

#### WBS 75.13 Integrated Payload Compatibility

A FDOR/CDR review plan was prepared and coordinated with MSFC. The MPE CDR data package was finalized and submitted for printing. Included were 24 MPE documents, drawings, the IIAs and the ICDs for IMCS.

All open action items were closed by memo. All open IDE RIDs for the IIAs and IPRD were incorporated. All DNs generated against the MPE PDR data package have been incorporated into the design documentation. The 21 DNs remaining open are in the process of being closed out through the release of the CDR data package.

The Astro-1 POP 84-1 summary was completed and is under review prior to incorporation into the PMIC POP 84-1 submission to MSFC.

A new change order is being requested to cover fabrication and material dollar costs for the Astro-1 MPE program. Some design hours are included to cover additional tasks not previously covered. The new change order will be aligned to the Revision D, MPE Development Plan, dated January 1984. The MPE Development plan contains identification of MPE hardware, electricable cables, GSE, and test equipment. With new tasks, a revised listing of items to be built by MSFC and TBE will be incorporated. The MPE Development Plan was reprinted the first week in January and distributed.

Critical materials, including long-lead items, are under constant review with procurement actions initiated as required. Items covered during the reporting period include heat pipes for the IRS, silverized tape for the IRS, spherical bearings for alignment hardware, titanium for mounts and the PCA, and fasteners. A new cable connector list was received from MSFC and is being reviewed prior to initiation of procurement.

A PERT chart was developed for the three main MPE flight assemblies; the cruciform, PCA, IRS, and their associated hardware. Critical path item tracking showed that the time allotted for fabrication of individual items is adequate. However, in the current schedule, most items are slated to be fabricated during the same time frame producing a peak of activity. A study of the schedules is being conducted to determine if fabrication of some items can be delayed or if sequencing the fabrication of parts for some items will relieve the over burdened fabrication schedule.

The epoxy test was performed on epoxy EA 956. The test was successful. Further tests are planned to determine the long range effects of the epoxy. A report will be submitted by February 1984.

A trip was made to KSC to participate in the Payload Ground Operations Working Group Meeting on December 1-2, 1983. Presentations were made by TBE on the following items: telescope alignment, access spacer concepts, IRS integration, PCA alignment, and PCA integration. No problems were uncovered concerning the telescope alignment, IRS

integration, or PCA integration. The access spacer, which was to be used to support the integrated cruciform during Level IV testing to allow access to the electronics on the IRS, was eliminated and the cruciform cradle will be used if access becomes necessary. A detailed flow sequence for buildup of the IRS at KSC is prepared and is under final review. This flow also shows that steps are required to gain access to the equipment on the IRS at various points in the integration at levels IV/III/II.

The remaining drawings for the main alignment hardware were completed. Fabrication of these items is scheduled to begin during January 1984.

The design concept for the thermal gradient sensing system was developed and reviewed with MSFC S&E, including test and verification plans correlated to IRS thermal vacuum tests.

Weight calculations are being made for the cruciform, PCA, and IRS assemblies. Presently 94 percent, 58 percent, and 89 percent of the weight for the cruciform, PCA, and IRS, respectively, has been calculated. Biweekly reports are being submitted to MSFC. The latest report showed the TBE/MPE limit weight to be exceeded by 240 kg.

The WFC Test Plan and Verification Plan were consolidated into one document with safety critical items being tracked in the Safety Hazard Report.

The requirements for use of MSFC's Payload Development Support System and EMI testing facility for WFC qualification and acceptance testing were submitted.

An MUA was reached with MSFC on a chassis with nylon connectors and silverplated kapton insulated wire for circuit interconnections for the WFC electronic interface unit.

A cost proposal in response to MSFC's C/O 247 final design, build, and test of the WFC was forwarded December 5, 1983.

MPE schedules and cost data associated with each major MPE grouping are provided on the following pages.



## EMPE DEVELOPMENT SCHEDULE

**THRE/PMIC PAYLOAD MISSION INTEGRATION SCHEDULE**

WBS NO. ALL  
RESP E. PEVEY

YEAR	MONTH
------	-------

## MAJOR MILESTONES

## CRUCIFORM ASSEMBLY

EXP MTG HDW (TI)

OSP MOUNT &amp; MTG HDW

OSP BAFFLE MTG

## Thermal Gradient Sensing System (TGSS)

**1**

**RECEIVED**

10-18-83

DATE PREPARED	10-18-83
REVISION DATE	1-10-84

LEGEND     $\diamond$  INPUT     $\nabla$  OUTPUT     $\rightarrow$  SLIP

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 $\square$  LATE START     $\square$  LATE COMPLETION

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# ASTRO-1 MPE COST STATUS

ITEM		AUTHORIZED			ACTUALS 1/13/84		
		HOURS	LABOR \$'s	TOTAL \$'s	HOURS	LABOR \$'s	TOTAL \$'s
1.	Cruciform	36,795	1,046,612	1,279,087	17,125	396,076	481,775
2.	PCA	33,035	912,405	1,070,552	15,794	381,409	512,700
3.	MLI	4,627	117,974	117,974	578	13,520	13,520
4.	Cables, Connectors &TP	1,015	22,312	22,312	1,245	25,367	25,367
5.	Telescope & WFC Mtg Hdw	5,266	130,421	174,156	5,078	107,409	118,039
6.	IRS	13,939	361,017	361,017	7,834	166,110	166,110
7.	GSE, Handling & Misc Hdw	1,417	40,406	40,406	617	13,428	13,428
8.	Telescope Alignment Hdw & Test	4,142	97,466	97,466	1,277	26,521	26,521
9.	IRS/Cruciform TV Hdw & Test	761	17,334	17,334	241	5,345	5,345
10.	PLT/PCA/Cruciform Alignment Hdw & Test	1,246	32,576	32,570	318	6,536	6,536
11.	Shipping Containers	1,816	53,011	53,011	0	0	0
12.	OSP Mounting Sys	3,297	89,416	147,718	4,340	92,168	135,763
13.	VFI Thermal Sys	686	19,694	19,694	299	8,641	8,641
14.	Planning & Coordination	3,580	123,852	123,852	2,150	50,065	50,065
15.	Mockup Cable Routing & Access	1,427	39,197	39,197	1,263	29,169	29,169

## **9. PREMISSION DEFINITION**

### **Dedicated Discipline Laboratory (DDL) Cost-Effectiveness Study**

This study authorized by TD-JA02-84-04 has progressed on a slower schedule than anticipated both because customer requirements for completion of the study were underestimated and because of efforts to improve the utility of the results.

At customer request, cost analyses were performed on the Earth Observation Mission (EOM) and Shuttle Radar Lab (SRL). This brought to six the number of missions analyzed versus the planned four. This was only possible because of the effort made early in the study to install the cost model on the VAX.

It became apparent during a late November trip to KSC that the results of the equipment requirements and facility utilization analysis would be much more useful if they were plotted instead of merely listed. The computer model was subsequently modified to accomplish this.

A three-volume DDL final report is being developed. Volume I is an executive summary, Volume II contains details of the cost analysis, and Volume III describes the hardware requirements analysis. A preliminary draft of Volume III has already been delivered while drafts of Volumes I and II are within several days of completion.

### **Accommodation Study of LeRC Middeck Payload**

This study authorized by TD-JA21-83-10 has progressed well. A draft copy of the Middeck Payload Accommodation Handbook update was submitted to the COR on December 29, 1983, for review. The comments were incorporated and the draft is now ready to be published.

### **Space Plasma Laboratory Preliminary Mission Definition**

This task authorized by TD-JA11-83-20 was initiated in late November 1983 and has been coordinated with S&E personnel to avoid duplication.

Configuration layouts were developed to supplement S&E effort (S&E configuration lacked subsystem definition).

Thermal analyses for SPL-1 and -2 were performed to ascertain system pressure drop and fluid volume requirements. This involved leakage estimate and volume contraction/expansion calculations.

RMS cable capabilities for RPDP and NASC-201 data transmission were investigated through consultation with SPAR. Preliminary analyses suggest that RMS can probably carry the data requirements in the format suggested by RPDP and NASC-201.

Further study is in progress to include STRIP data requirements and Middeck accommodation of the DEPs of AEPI, ENAP, and SEPAC. This task was introduced through TD-JA11-84-1 in the second week of January 1984.



## **10. MISSION PECULIAR EQUIPMENT SUPPORT STRUCTURE**

### **WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT**

#### **WBS 35.1 - Mission Peculiar Equipment (MPE)**

Fracture critical inspection of the keel structure on MPES  
SNs 003 and 004 was completed using the eddy current method. As  
expected, no discernible cracks were detected.

## 11. MIDDECK

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment

Two NLS5H24-35PS connectors were shipped to Mr. Don Wohleber/ET32 on November 18, 1983. Ninety percent of the previously ordered electrical connectors has been received and is in storage at TBE.

The Middeck Electronics Module (MEM) fabrication and assembly was completed during this period. The unit was functionally tested, both hardware and software, prior to its shipment to MSFC to be tested on their vibration table.

Problems were encountered with the MEM when it was returned to TBE for further functional testing. Troubleshooting and failure analysis pinpointed the problem to be the read circuitry of the GFE tape recorder. The tape recorder from the GSE unit was installed in the MEM for the follow-on functional testing and integration testing to be conducted by MSFC.

#### WBS 75.2 - MPE Design

The MEM Software Detailed Design Document was revised to reflect the "as built" configuration. This document is scheduled to be released in conjunction with the MEM Acceptance Data Package.

The GSE Kaypro software was completed. The operation of the Kaypro software and the MEM interface unit is presently being documented in the GSE Operation and Maintenance Manual, scheduled to be released with the MEM Acceptance Data Package.

#### WBS 75.11 - Configuration Change Coordination and Processing

We continued to process and track DN closeouts against the ADSF, ARC, and IEF milestone review data packages and to process change requests submitted by MSFC organizational elements. We published reports depicting DN and open change activities on a regular basis.